

ABSTRACT OF THE DISCLOSURE

An apparatus and method for metabolic cooling and insulation of a user in a cold environment. In its preferred embodiment the apparatus is a highly flexible composite material having a flexible matrix containing a phase change thermal storage material. The apparatus can be made to heat or cool the body or to act as a thermal buffer to protect the wearer from changing environmental conditions. The apparatus may also include an external thermal insulation layer and/or an internal thermal control layer to regulate the rate of heat exchange between the composite and the skin of the wearer. Other embodiments of the apparatus also provide 1) a path for evaporation or direct absorption of perspiration from the skin of the wearer for improved comfort and thermal control, 2) heat conductive pathways within the material for thermal equalization, 3) surface treatments for improved absorption or rejection of heat by the material, and 4) means for quickly regenerating the thermal storage capacity for reuse of the material. Applications of the composite materials are also described which take advantage of the composite's thermal characteristics. The examples described include a diver's wet suit, ski boot liners, thermal socks, gloves and a face mask for cold weather activities, and a metabolic heating or cooling blanket useful for treating hypothermia or fever patients in a medical setting and therapeutic heating or cooling orthopedic joint supports.